No.	B.D. &c.	R.A. (1900). h m	Decl. (1900). ° ′	Mag.	Authority.
230	Es. 1048	23 6·0	+60 43	9·0	Es.
231	−21°,6376	6·3	−21 32	9	H.
232	+48°,4051	22·2	+48 58	9·3	Es.
233	+2°,4709	41·3	+2 56	6·2	Se.
234	+5°,5223	44·0	+5 50	8·7	H.
235	+60°,2634	48·0	+60 27	9·0	Es.
236	+59°,2810	56·2	+59 48	7·8	Du.
237	+42°,4827	59·5	+43 0	8·4	Es.

Further Researches on the Orbit of γ Lupi = h 4786.

By T. J. J. See, A.M., Ph.D. (Berlin).

In the *Monthly Notices* for 1897 November I have indicated the general nature of the orbit of *γ Lupi*. At the time that paper was prepared, it did not seem probable that a material improvement of the result announced could be expected for some twenty years; but a few observations made by Captain Jacob at a particularly opportune epoch, near the middle of the century and unknown to me at the time of my first investigation, have made possible a revision which defines the motion of this remarkable star with singular precision. We are thus enabled to determine a set of elements which are very satisfactory. Considering the small number of observations available, it must be conceded that this result is one of the happiest yet afforded by the history of double star astronomy. The excellence of the orbit derived from only a few observations is due to their advantageous distribution, which gives each measure a particularly decisive import. The singular and almost unique character of the orbit also renders its determination comparatively easy. We find that the system of *γ Lupi* is situated like that of 42 *Comæ Berenices*, and that all the motion takes place in a right line at position angles 93°·5—273°·5. An investigation of the areas described shows that the major axis of this system does not depart sensibly from the line of sight; and hence the determination of the elements is somewhat easier than in the case of 42 *Comæ Berenices*, where λ differs sensibily from 90°.

As nearly all the observations of *γ Lupi* were given in my former paper, I content myself here with adding those since unexpectedly discovered, and a few which Mr. Boothroyd and I have recently taken at Flagstaff.

t	θ_o	ρ_o	Remarks.
1853·125	274°·6	1″·14	1*n* Jacob. Discs in contact.
1853·130	272·4	0·98	1*n* Jacob. Preceding star certainly the least, but the difference is less than half a magnitude.
1856·171	275·4	0·75	3–2*n* Jacob. Magnitudes 4–4.
1877·411	Not divided		1*n* Melbourne Obs., 8-inch refractor.
·419	„ „		1*n* „ „
·422	Plainly elongated		1*n* „ „
1878·679	Not divided		1*n* „ „
1898·302	93·9	0·40	See. Clearly separated with black line between components.
·302	92·7	0·46	
·302	92·0	0·35	See. Excellent measures.
·302	93·9	0·35	
1898·302	93·4	0·46	Boothroyd.

The Melbourne observations were kindly communicated by Mr. Innes, of the Royal Observatory, Cape of Good Hope.

It is singular that Captain Jacob should have been able to measure this close object with a 5-inch telescope, and the result speaks well for his skill as an observer. It is needless to say that his observations now possess an interest scarcely inferior to those of Herschel himself.

As the south declination of this object is about 41°, our recent observations were made at an altitude of only about 12° or 13°; yet under a singularly steady atmosphere the stars were well shown, and most of the time distinctly divided. The measures are therefore entitled to the highest confidence.

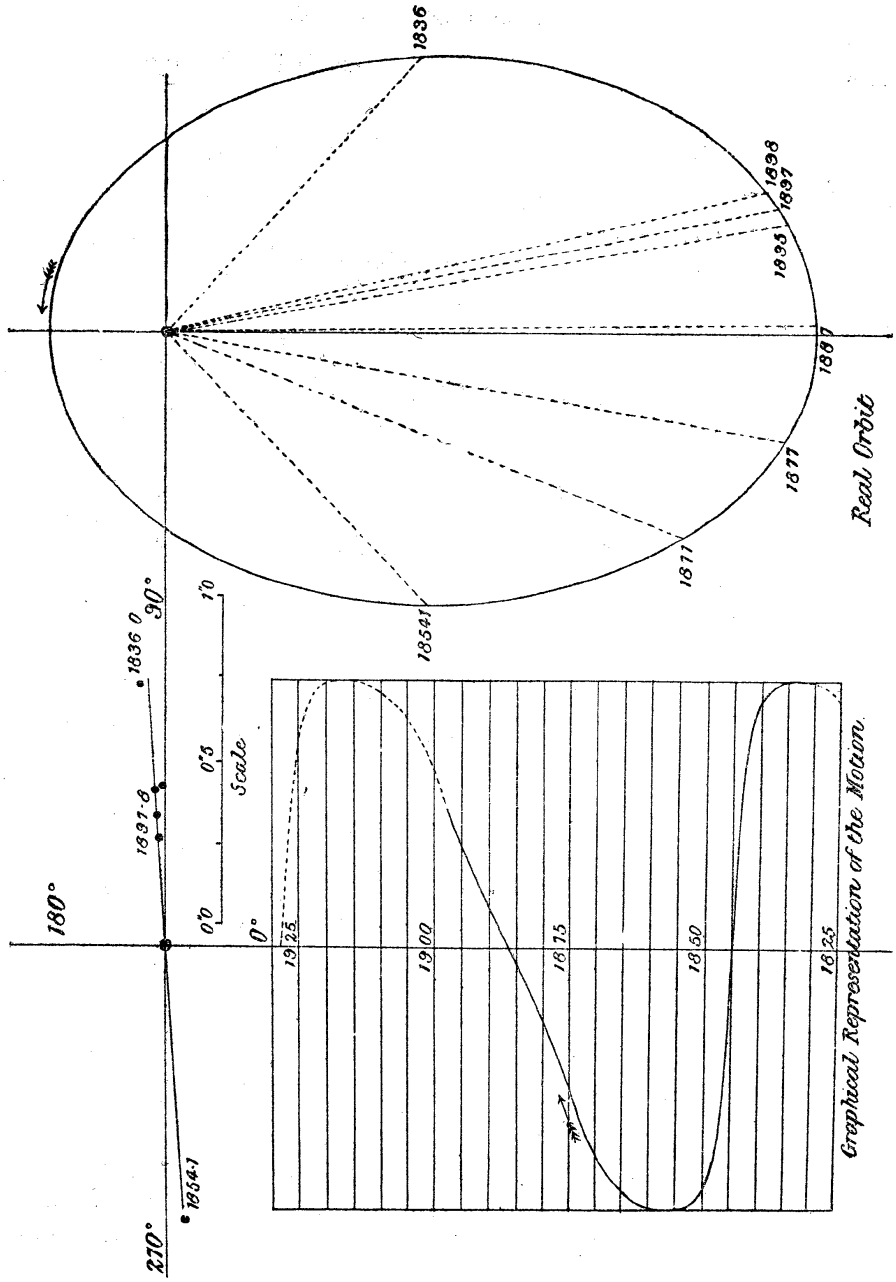
The following are the elements of γ *Lupi* = *h* 4786 :

P = 83·0 years	Ω = 93°·5
T = 1845·0	i = 90°·±
e = 0·70	λ = 90°·±
a = 1″·10	n = ±4°·3374

Apparent orbit, a right line in 93°·5—273°·5, 1″·56 in length.

In the accompanying table these elements are compared with the best means I could form from all the known observations of this star. As the elements are approximate, and the motion rather slow, I have taken the epochs merely to the nearest tenth year.

The figure shows the real and apparent orbits, and gives a graphical representation of the motion. The components are now steadily widening out, and ought soon to be visible to other southern observers.



Orbit of γ *Lupi* = *h* 4786.

The period of γ *Lupi* remains uncertain to the extent of possibly five years, but a longer correction to the above value seems altogether improbable.

Comparison of computed with observed places.

t	θ_o	θ_c	ρ_o	ρ_c	$\theta_o-\theta_c$	$\rho_o-\rho_c$	n	Observers.	Remarks.
1836·0	95°·3	93°·5	0″·78	0″·78	+1°·8	0″·00	16–9	Herschel	
1854·1	274°·1	273°·5	0·83	0·78	+0·6	0·05	5–3	Jacob	
1871·5		273°·5		0·58			1	Russell	Not divided.
1877·5	270° ±	273°·5		0·31	−3°·5		1	Russell	Smaller end goes first.
1887·5		93°·5		0·03			1	Pollock	Single in 11½ in.
1895·6		93°·5		0·32			3	Sellors	Single
1897·1	92°·4	93°·5	0·34	0·36	−1°·1	−0·02	2	See	
1897·1	90°·4	93°·5	0·47	0·36	−3°·1	+0·11	1	Cogshall	
1898·3	93°·1	93°·5	0·39	0·40	−0°·4	−0·01	2	See	
1898·3	93°·4	93°·5	0·46	0·40	−0°·1	+0·06	1	Boothroyd	

The eccentricity of the orbit is quite high, and is comparatively well determined by the great inequality of the motion at the two apses. The value here found will probably not require a correction larger than ±0·05.

In closing I may perhaps observe that this remarkable system and 42 *Comæ* appear to differ from *Algol* variables chiefly in the equal luminosity of both components and the greater periods required for the revolution of their attendants.

Lowell Observatory, Flagstaff, Arizona:
1898 *May* 20.

Note on the Level Errors of the Cape Transit Circle.

By W. H. Finlay, M.A.

In vol. i. Part V. of the *Annals of the Cape Observatory* I discussed the variations of the adjustments of the transit circle from the time of its erection, 1856, up to 1882. The most interesting of these variations were those in level, which were shown to have a well-marked annual period, and which also, there was some reason to believe, were subject to a period of about 18 or 19 years.

As the results of 15 additional years are now available it may be of interest to put on record the behaviour of the level during that time.

In 1894 the error of azimuth had become inconveniently large. On May 16–17 both Ys were moved from their founda-